WE CLAIM:

1. An autonomous power source, comprising:

a movable structure; and

a power harvester mounted to said structure such that it moves with said structure, said power harvester comprising:

a coil,

a magnet,

a low-friction ferrofluidic bearing in contact with and supporting one of said coil or magnet,

said coil, magnet and bearing arranged such that said magnet and said coil move with respect to each other when said structure is in motion such that an electrical current is produced in said coil.

2. The power source of claim 1, wherein said motion is rotary, linear, or random.

3. The power source of claim 1, further comprising electronic circuitry which is connected to be powered by said electrical current.

4. The power source of claim 1, further comprising:

electronic circuitry;

an energy storage system connected to power said electronic circuitry; and

an interface circuit connected to receive said electrical current and to provide energy for storage in said energy storage system.

5. The power source of claim 4, wherein said energy storage system is a rechargeable battery and said interface circuit provides current to recharge said rechargeable battery.

6. The power source of claim 4, wherein said electronic circuitry comprises a sensor and a wireless transmitter which transmits a signal that varies with the output of said sensor.

7. The power source of claim 6, further comprising a wireless receiver external to said movable structure which receives said transmitted signal.

8. The power source of claim 4, wherein said electronic circuitry comprises a sensor and a data storage device which stores data that varies with the output of said sensor.

9. The power source of claim 4, wherein said electronic circuitry comprises a sensor and a wireless transceiver which transmits a signal which varies with the output of said sensor.

10. The power source of claim 4, wherein said electronic circuitry comprises an air pressure sensor.

11. The power source of claim 10, wherein said air pressure sensor is an absolute pressure sensor.

12. The power source of claim 11, further comprising:

a wireless transceiver which transmits a signal which varies with the output of said absolute pressure sensor;

a wireless receiver external to said movable structure which receives said transmitted signal;

an atmospheric pressure sensor external to said movable structure; and

circuitry external to said movable structure

connected to receive said transmitted signal and the output of said atmospheric pressure sensor and to compute gage pressure.

13. The power source of claim 1, wherein said power harvester further comprises a closed nonmagnetic tube, said coil affixed to the exterior of said tube, said magnet and bearing enclosed within said tube such that said magnet is in contact with and supported by said bearing and is free to move within said tube such that said magnet and said coil move with respect to each other when said movable structure is in motion such that an electrical current is produced in said coil.

14. The power source of claim 13, wherein said movable structure is a vehicle wheel and said closed tube rotates with said wheel.

15. The power source of claim 14, further comprising a tire mounted on said vehicle wheel, said power harvester mounted on an outer surface of said wheel within said tire.

16. The power source of claim 14, further comprising a tire mounted on said vehicle wheel, said power harvester integrated into the body of said wheel.

17. The power source of claim 13, wherein said closed tube is hermetically sealed.

18. The power source of claim 13, wherein said magnet and coil move non-circularly with respect to each other when said movable structure is in motion.

19. The power source of claim 18, wherein said closed tube is a nonmagnetic non-circular tube and said magnet

slides between the opposite ends of said tube when said movable structure is in motion.

20. The power source of claim 19, wherein said non-circular tube is a linear tube.

21. The power source of claim 19, further comprising recoil end magnets affixed at opposite ends of said closed non-circular tube, the polarities of said end magnets selected to repel said sliding magnet when it comes into close proximity with said end magnets.

22. The power source of claim 18, wherein said closed tube is a non-circular tube and said power harvester comprises two or more of said magnets, each of which is supported by respective ferrofluidic bearings, said magnets arranged within said tube such that each magnet is separated from its adjacent magnets by a gap maintained by magnetic repulsion and such that said magnets slide between the opposite ends of said tube when said movable structure is in motion.

23. The power source of claim 22, further comprising recoil end magnets affixed at opposite ends of said closed non-circular tube, the polarities of said end magnets selected to repel the sliding magnet adjacent to said end magnet when said sliding magnet comes into close proximity with said end magnets.

24. The power source of claim 13, wherein said movable structure is a rotatable structure and said closed tube is a circular tube which encircles and rotates with said structure, said magnet and bearing enclosed within said circular tube such that said magnet moves within said tube when said movable structure is in motion.

25. The power source of claim 24, wherein said circular tube has a rectangular cross-section with top and bottom outer surfaces and smooth top and bottom inner surfaces, which encircles and rotates with said structure, and said power harvester comprises at least one cylindrical or nearly-cylindrical magnet having its magnetic axis perpendicular to the plane of said tube, said coils affixed to the top and/or bottom outer surfaces of said tube with their center axes along the direction of said magnetic axis but orthogonal to the direction of magnet movement.

26. The power source of claim 25, wherein said at least one cylindrical or nearly-cylindrical magnet comprises two magnets stacked on either side of a spacer, with both stacked magnets having the same magnetic orientation.

27. The power source of claim 25, wherein said at least one cylindrical or nearly-cylindrical magnet comprises more than one cylindrical or nearly-cylindrical magnet linked together with a spacer, said linked magnets arranged such that there is opposite magnetic polar orientation between adjacent magnets, each of said linked magnets in contact with and supported by respective low-friction ferrofluidic bearings.

28. The power source of claim 27, wherein said at least one cylindrical or nearly-cylindrical magnet comprises three cylindrical or nearly-cylindrical magnets linked together with said spacer.

29. The power source of claim 27, wherein said at least one cylindrical or nearly-cylindrical magnet comprises *n* cylindrical magnets linked together with a

spacer, said linked magnets having a known angular spacing between adjacent magnets, said coils affixed to said tube in groups of *n* coils, with the coils of each group arranged such that they have said known angular spacing between adjacent coils such that the outputs of all coils in a group will be in phase electrically.

30. The power source of claim 25, wherein top and bottom rails extend from said top and bottom inner surfaces, respectively, and confine the motion of said at least one cylindrical or nearly-cylindrical magnet to the center of said tube and provide finite air gaps between the magnets' side walls and the side walls of said tube.

31. The power source of claim 25, wherein said coils are affixed to said tube in pairs, with each pair's first coil on said top outer surface and each pair's second coil directly below said first coil on said bottom outer surface.

32. The power source of claim 25, wherein said coils are filled with a soft magnetic material with a low remnant magnetization and coercive energy.

33. The power source of claim 24, wherein said power harvester comprises at least one cylindrical or nearly-cylindrical magnet having its magnetic axis point toward the radial direction of said tube, said coils affixed to the inside and outside diameters of said tube.

34. The power source of claim 33, wherein said at least one cylindrical or nearly-cylindrical magnet comprises more than one cylindrical or nearly-cylindrical magnet linked together with a spacer, said linked magnets arranged such that there is opposite magnetic polar

orientation between adjacent magnets, said spacer curved such that it has a curvature equal to the average curvature of said tube's inside and outside diameters, each of said linked magnets in contact with and supported by respective low-friction ferrofluidic bearings.

35. The power source of claim 34, wherein said at least one cylindrical or nearly-cylindrical magnet comprises *n* cylindrical or nearly-cylindrical magnets linked together with a spacer, said linked magnets having a known angular spacing between adjacent magnets, said coils affixed to said tube in groups of *n* coils, with the coils of each group arranged such that they have said known angular spacing between adjacent coils such that the outputs of all coils in a group will be in phase electrically.

36. The power source of claim 33, wherein said coils are affixed to said tube in pairs, with each pair's first coil on said tube's outside diameter and each pair's second coil directly opposite said first coil on said tube's inside diameter.

37. The power source of claim 33, wherein said coils are filled with a soft magnetic material with a low remnant magnetization and coercive energy.

38. The power source of claim 1, wherein said movable structure is a rotatable structure and said power harvester further comprises a closed nonmagnetic circular tube which encircles and rotates with said structure, said coil and bearing enclosed within said circular tube such that said coil is in contact with and supported by said bearing and is free to move within said tube when said structure is in motion, said magnet mounted to said structure outside of

said tube such that said magnet and said coil move with respect to each other when said structure is in motion such that an electrical current is produced in said coil.

39. The power source of claim 38, further comprising an electronics package located within said tube and coupled to said coil, said electronics package comprising:

electronic circuitry;

an energy storage system connected to power said electronic circuitry;

an interface circuit connected to receive said electrical current from said coil and to provide energy for storage in said energy storage system;

a sensor; and

a wireless transmitter which transmits a signal that varies with the output of said sensor.

40. The power source of claim 39, further comprising a wireless receiver external to said structure which receives said transmitted signal.

41. The power source of claim 39, wherein said sensor comprises an absolute pressure sensor.

42. The power source of claim 41, further comprising:

a wireless receiver external to said movable structure which receives said transmitted signal;

an atmospheric pressure sensor external to said movable structure; and

circuitry external to said movable structure connected to receive said wirelessly transmitted signal and the output of said atmospheric pressure sensor and to compute gage pressure.

43. The power source of claim 42, wherein said

circuitry is further arranged to display said computed gage pressure.

44. The power source of claim 38, further comprising additional coils interconnected to said coil, each of said additional coils enclosed within said circular tube and in contact with and supported by a respective low-friction ferrofluidic bearing such it is free to move within said tube when said movable structure is in motion.

45. A wireless tire pressure monitoring system, comprising:

an autonomous power source, comprising:

a power harvester mounted to a vehicle wheel such that it rotates with said wheel, said power harvester comprising:

a coil,

a magnet,

a low-friction ferrofluidic bearing in contact with and supporting said magnet,

said coil, magnet and bearing arranged such that said magnet and said coil move with respect to each other when said wheel is in motion such that an electrical current is produced in said coil;

an air pressure sensor for sensing the air pressure within a tire mounted on said wheel;

a data storage and/or wireless transmitter circuit which stores and/or transmits data which varies with said sensor output;

a rechargeable battery connected to power said circuit; and

an interface circuit connected to receive said electrical current and to provide energy to recharge said rechargeable battery.

46. The tire pressure system of claim 45, wherein said power harvester further comprises a closed nonmagnetic tube having a rectangular cross-section with top and bottom outer surfaces and smooth top and bottom inner surfaces, which encircles and rotates with said wheel, said power harvester comprising at least one cylindrical or nearly-cylindrical magnet having its magnetic axis perpendicular to the plane of said tube, said magnet and bearing enclosed within said tube such that said magnet is in contact with and supported by said bearing and is free to move within said tube, said coils affixed to the top and/or bottom outer surface of said tube with their center axes along the direction of said magnetic axis but orthogonal to the direction of magnet movement, such that said magnet and said coil move with respect to each other when said wheel is in motion such that an electrical current is produced in said coil.

47. The tire pressure system of claim 46, wherein said air pressure sensor is an absolute pressure sensor and said data storage and/or wireless transmitter circuit is a transmitter circuit, further comprising:

a wireless receiver external to said wheel which receives said transmitted signal;

an atmospheric pressure sensor external to said wheel; and

circuitry external to said wheel connected to receive said wirelessly transmitted signal and the output of said atmospheric pressure sensor and to compute and display gage pressure.

48. The tire pressure system of claim 45, wherein said power harvester further comprises a closed nonmagnetic tube which encircles and rotates with said wheel, said power harvester comprising at least one cylindrical or

nearly-cylindrical magnet having its magnetic axis point toward the radial direction of said tube, said magnet and bearing enclosed within said tube such that said magnet is in contact with and supported by said bearing and is free to move within said tube, said coils affixed to the inside and outside diameters of said tube, such that said magnet and said coil move with respect to each other when said wheel is in motion such that an electrical current is produced in said coil.

49. The tire pressure system of claim 48, wherein said air pressure sensor is an absolute pressure sensor and said data storage and/or wireless transmitter circuit is a wireless transmitter circuit, further comprising:

a wireless receiver external to said wheel which receives said transmitted signal;

an atmospheric pressure sensor external to said wheel; and

circuitry external to said wheel connected to receive said wirelessly transmitted signal and the output of said atmospheric pressure sensor and to compute and display gage pressure.

50. The tire pressure system of claim 45, wherein said power harvester further comprises a closed nonmagnetic tube which encircles and rotates with said wheel, said coil and bearing enclosed within said circular tube such that said coil is in contact with and supported by said bearing and is free to move within said tube when said movable structure is in motion, said magnet mounted to said wheel such that said magnet and said coil move with respect to each other when said structure is in motion such that an electrical current is produced in said coil.

51. The tire pressure system of claim 50, wherein

said air pressure sensor is an absolute pressure sensor and said data storage and/or wireless transmitter circuit is a wireless transmitter circuit, further comprising:

a wireless receiver external to said wheel which receives said transmitted signal;

an atmospheric pressure sensor external to said wheel; and

circuitry external to said wheel connected to receive said wirelessly transmitted signal and the output of said atmospheric pressure sensor and to compute and display gage pressure.

52. The tire pressure system of claim 45, wherein said closed tube is a non-circular tube and said magnet slides between the ends of said tube when said wheel is in motion.

53. A method of assembling an autonomous power source which comprises a tube that contains a plurality of magnets in prescribed positions and a ferrofluidic bearing which reduces the friction between said magnets and the interior wall of said tube, comprising:

affixing magnets to a template in positions which mirror said prescribed positions, each of said affixed magnets having a polarity opposite to that of the power source magnet it mirrors;

placing said template below said tube;

inserting said magnets into said tube;

adding said ferrofluidic bearing to said tube; and

causing said magnets to move within said tube such that they align over their respective template magnets.